

# Designer Fluid for use in a Single Loop Variable Heat Rejection Thermal Control System, Phase I

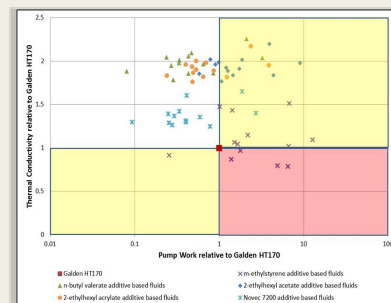
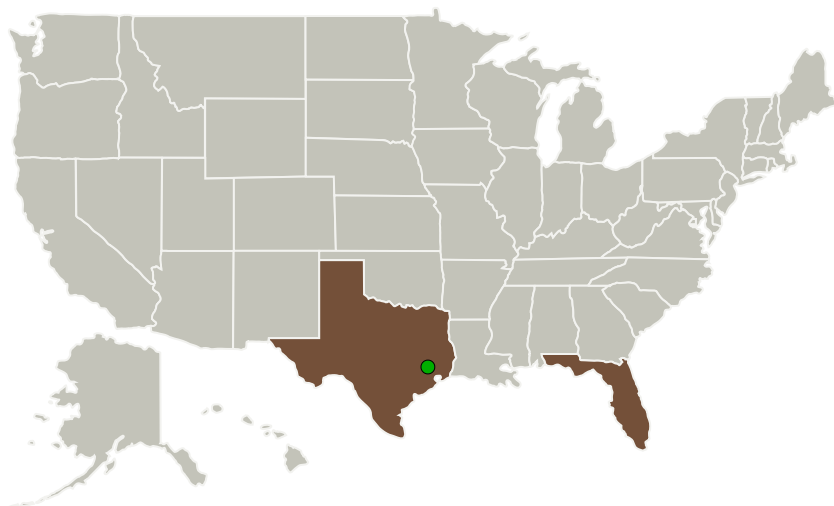
Completed Technology Project (2015 - 2015)



## Project Introduction

The efficient thermal control of vehicles is essential to the success of every single NASA mission. All vehicles have very tight requirements for the thermal control systems while simultaneously placing incredibly stringent demands upon them. These demands are getting even more intense given the shift towards variable heat rejection, which is essential in missions reaching beyond the lower earth orbit. Specifically, the thermal control fluid must maintain excellent thermal properties for heat rejection under peak conditions while at the same time remain liquid at extremely low temperatures down to -90 Celsius. Currently used fluids either do not meet the low temperature requirement (glycol/water mixture) or do not have thermal properties conducive to a compact, efficient system (Galden). Mainstream has identified several promising next generation thermal fluids using computation chemical techniques. In the Phase I, Mainstream will experimentally evaluate the thermal properties of promising single chemicals and chemical mixtures. These data will be used to determine the overall benefit to a thermal control system in terms of thermal performance and pumping power. In Phase II, Mainstream will perform more long term durability, compatibility and performance studies in a simulated test-loop representative of conditions encountered on NASA spacecraft.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
Mainstream Engineering Corporation	Lead Organization	Industry	Rockledge, Florida
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

## Primary U.S. Work Locations

Florida	Texas
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## Project Transitions

▶ **June 2015:** Project Start

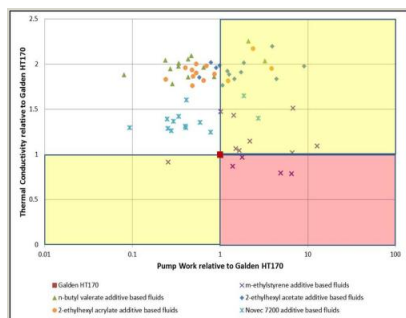
✓ **December 2015:** Closed out

**Closeout Summary:** Designer Fluid for use in a Single Loop Variable Heat Rejection Thermal Control System, Phase I Project Image

### Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/138794>)

## Images



### Briefing Chart Image

Designer Fluid for use in a Single Loop Variable Heat Rejection Thermal Control System, Phase I  
(<https://techport.nasa.gov/image/135785>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Mainstream Engineering Corporation

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

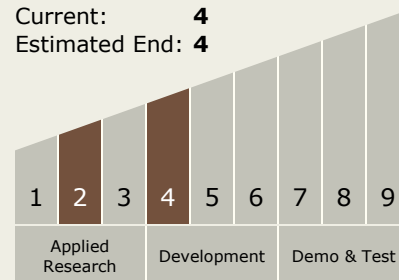
Carlos Torrez

### Principal Investigator:

J M Cutbirth

## Technology Maturity (TRL)

Start: **2**  
Current: **4**  
Estimated End: **4**



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## Technology Areas

### Primary:

- TX14 Thermal Management Systems
  - └ TX14.2 Thermal Control Components and Systems
    - └ TX14.2.2 Heat Transport

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System